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# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Man-Made Quartz

See Page 91

A SCIENCE SERVICE PUBLICATION

# What General Electric people are saying . . .

## G. C. HOUSTON

*Mr. Houston is Manager—Manufacturing Training Services Section, Manufacturing Personnel Development Services Department.*

" . . . Leadership ability is not developed by attending lectures or by reading, even though such activities may be helpful in stimulating thinking and developing a higher degree of understanding. We believe, without qualification, that the only sound way to acquire and develop these abilities is through the process of learning by doing. Consequently, any well-conceived leadership development program is built around these principles . . .

Provide opportunities in the work situation to practice doing those things required of men in positions of leadership responsibility.

Associate with proved leaders.

Adequately evaluate performance and give sound guidance and counsel along the way.

Each of the individual's assignments in his work situation should be supervised by a man who has already proved his leadership ability, who is genuinely interested in developing others, and who is familiar with the objectives of the assignment in relation to the needs of the candidate. The assignment should be planned to provide experience which will not only increase the candidate's know-how, but which will also provide an opportunity to strengthen his weak points or further develop his specific abilities.

*G. E. Review*

## P. R. HEINMILLER

*Mr. Heinmiller is Managing Editor of the General Electric Review.*

" . . . There is more writing in industry than turning out technical reports. There are letters and memorandums, reports and articles to associates in your field of engineering, and what is most difficult of all, presentations to management. I say most difficult of all because you must get your ideas across to non-engineers, and you cannot take refuge in technical jargon.

When writing signed articles for

technical publications, you must: know your audience, write so your audience can understand you, and keep everything in a logical sequence. Be complete and concise, use active verbs, mix short sentences with long ones to give a change of pace, and avoid clichés. Start with an outline and then fill it in.

All other things being equal, the engineer who is articulate, who is able to express himself orally and in writing in an understandable manner, will gain more prominence than one who cannot. (I prefer the word "prominence" to "success," because the latter has conflicting definitions and often carries a high price tag.)

*at Case Institute of Technology,  
Cleveland*

## H. M. ROZENDAAL

*Dr. Rozendaal is Manager—Biological Studies Section, General Electric Research Laboratory.*

" . . . Engineers and physicists have contributed much to technics in medicine and biology. Many of their efforts have been in the field of medical physics or biophysics. They have led to the discovery or development of apparatus, such as electrocardiographs, x-ray machines, diathermy equipment, electron microscopes, analytical apparatus using ultraviolet and infrared light, to mention only a few. Drs. Whitney and Coolidge in our Laboratory have been pioneers in this field and their contributions are known to every physician.

And now atomic energy has seriously affected medical diagnosis, medical therapy and biological research. New apparatus is being introduced to medical personnel. New devices for more accurate measurements and localization of radioactive isotopes in the body are needed. In these and allied fields, the engineer,

the medical man and the biologist have many interests in common. We must encourage these people to get together to explore problems of mutual interest. Such an approach will be of interest to the scientists but, much more important, it may result in developments of great benefit to our patients.

*Institute of Radio Engineers,  
Syracuse, N. Y.*

## H. F. MILLER

*Dr. Miller is Manager—Advance and Development Engineering Services Division*

It is estimated that at present there are about 100-million acres of worn-out land in this country. Bringing this land back to productivity is one of the major tasks that must be undertaken.

This will require vast quantities of the nitrogen-, phosphorus-, and potash-type fertilizers. But apart from this, recent discoveries have shown that it is possible not only to alter the chemical composition of soil but also its physical composition—characteristics such as porosity, density, texture, and moisture retention. Small quantities of organic materials—the "soil conditioners" as they are called on the retail market—are capable of doing many of the things that only humus in the soil could formerly do.

In the next 25 years the need will also arise for other chemical additives needed for the soil to support the growth of the mold or the fungi now present in humus. There is conjecture that soil molds and bacteria play a great role in transferring nutrients from the soil to the roots of the growing plants. This is a chemical industry—not now in existence—that could be breath-taking in scope.

*G.E. Review*

*You can put your confidence in—*

**GENERAL  ELECTRIC**

## PHYSICS

# Atomic Battery Made

Atomic energy is converted directly into electricity by a new battery that uses electrons from strontium 90, a waste product from atomic piles, to bombard a transistor.

► **ATOMIC ENERGY** has been converted directly into electricity through a revolutionary atomic battery using a waste product of atomic reactors.

The waste product is strontium 90, which emits high-speed electrons that bombard pea-sized transistors. The transistors, which are themselves revolutionary in the field of electronics, in turn emit 200,000 slow-moving electrons for each high-speed electron striking the material from the strontium 90.

The electric current so created is strong enough to produce an audible tone in a telephone receiver.

The Radio Corporation of America battery is thimble-sized and has a life expectancy of 20 years. It is a climax to 40 years of scientific efforts aimed at converting the radiation of the atom's nucleus directly into electricity. Patents on the forerunner of the battery were issued a year and a half ago. (See SNL, June 14, 1952, p. 371.)

Engineers foresee immediate possibilities for the revolutionary battery. Its ruggedness, long life and compactness make it especially attractive for modern electronic equipment using very small parts.

The battery promises to provide the power source in portable pocket-sized radio receivers, hearing aids and signal controls. Eventually, it is believed the battery will be used in portable short-range radio transmitters for radio telegraph and telephone work. It also may go into radio beacons for air and sea navigation.

Other waste products of atomic reactors are expected to produce atomic batteries as good as the strontium 90 battery, which gives an electric output that far exceeds any such attempt made previously.

The development of the atomic battery has been hailed as a "significant development in the utilization of atomic energy for peaceful purposes."

Previous attempts to harness the atom to the nation's electric gadgets have been encumbered because the atom's energy could not be transformed directly into electricity on a large scale.

Networks of piping to carry liquid metals through the hot reactor were needed. The heat picked up in the reactor then was released in water to generate steam that in turn drove electric generators.

The technical details of the battery are reported in a current *Physical Review* by Paul Rappaport of the David Sarnoff Research Center of RCA, Princeton, N. J. The June, 1952, patent was granted to Dr. Ernest G. Linder, Brig. Gen. David Sarnoff, chairman of RCA's board, credited the two physicists with development of the atomic battery.

Germanium and silicon transistors are suitable for the battery. They are bombarded by beta rays from the strontium.

The 200,000 low-speed electrons released by one high-speed electron from the radioactive strontium source flow across the wafer's junction, producing a voltage which can be applied to an electronic circuit and cause a current to flow.

When connected to the transistor circuit, the battery's one-fifth volt potential provides a current of five microamperes, an output of approximately one-millionth of a watt. The best efficiency of energy conversion so far obtained exceeds 1%; that is, the ratio of useful electrical power developed by the battery is at least a thousandth of the energy of the beta particles as they leave the radioactive source.

The greater part of the original energy is lost as heat in the crystal wafer. As present techniques are refined, an efficiency of 10% can be developed, the scientists expect.

Greater power can be achieved by increasing the present 50 millicurie quantity of strontium 90 or by placing a number of such units in a single container.

Although in theory, virtually any radioactive material could be the source of an atomic battery, strontium 90 was chosen to activate the device because of its high energy beta radiation, its relatively long life, its low shielding requirements and its availability from the Atomic Energy Commission.

Strontium 90 is not now obtainable in completely purified form. Since some of the unwanted radioactive materials are emitters of gamma radiation, shielding is necessary in the laboratory device.

However, strontium 90 in purified form, emits only beta particles which, for the quantities that would be used in a small atomic battery, the scientists report, would not raise problems of shielding.

The extent of the effect of beta radiation on the crystal wafer is not yet known, but it is known that the crystal structure of many substances is gradually damaged by bombarding electrons.

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## MEDICINE

## Polio Vaccine Trial Postponed

► **DUE TO** delays in the manufacture of the trial polio vaccine, the nation-wide validity tests are expected to get under way in late March or early April, instead of February, it was announced by Basil O'Connor, president of the National Foundation for Infantile Paralysis.

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**ATOMIC BATTERY**—This photograph shows a magnified model of the two basic elements of the experimental battery that convert atomic energy directly into electrical energy, using a radioactive source placed next to the tiny transistor.

## GENERAL SCIENCE

# International Science

Despite much secret scientific work, many promising international scientific activities are now being conducted under aegis of the United Nations.

► SCIENCE HAS almost from its beginnings been international. Even during early and primitive wars, scientists often exchanged information and acted as though they were truly citizens of the world. For instance, Franklin gave Capt. Cook safe conduct during the American Revolution.

The coming of atomic energy during the second World War materially changed this. Much of science became "Top Secret."

Yet strangely enough, out of the past war and allied to the United Nations there have come international scientific activities of some promise.

Perhaps these activities like UNESCO, the World Health Organization, the Food and Agricultural Organization and the World Meteorological Organization will become even more respectable now that President Eisenhower has proposed to the United Nations a peaceful pooling of fissionable materials on a limited scale.

The holdout on international scientific cooperation has been Soviet Russia. Her scientists have been to only a limited number of international conferences. The World Meteorological Organization is one of the few international bodies outside the main United Nations to which Soviet Russia adheres with some enthusiasm.

If talks are begun with Soviet Russia on the Eisenhower atomic energy proposals, some of the other attempts at scientific cooperation may be encouraged. There is the nuclear laboratory that a number of European nations are establishing under UNESCO encouragement. This effort will be located in Switzerland. (See SNL, Aug. 1, 1953, p. 67.)

There have been in the past a number of so-called international laboratories, notably the Zoological Laboratory at Naples and the Jungfraujoch High Altitude Station. These have always been very small operations, in no sense comparable with the immense atomic energy activities of the United States and even meager compared with the cooperative efforts of some universities within an individual country.

About the time that UNESCO was being created, a French delegation submitted to the Economic and Social Council of the United Nations a report on the United Nations Research Laboratories.

"Where man is fighting the unknown," said this report, "intellectual comradeship acquires extraordinary strength and value. If every scientific victory is made a joint triumph, scientific research will have acquired its true meaning."

Research would be more effective, "if conducted with all the requisite resources of perfectly equipped international laboratories

for which the United Nations would be financially and intellectually responsible," it was also argued.

"An imperative need of democracy in the international field," the French declared with a world-wide flourish worthy of the later U.S.A. Point Four, "is that small countries with limited budgets should not suffer in their moral and intellectual development from purely material inferiority."

UNESCO took up the task of getting international research underway after the United Nations committee had listed a computation center, a brain institute, an institute of social sciences, an arid zone research laboratory, an international astronomical laboratory, an institute for the chemistry of living matter and an international meteorological laboratory in that priority order.

Of these, the arid zone research and the work in the center for nuclear research have made some progress. Because so many of the UN nations of the Middle East have deserts to cope with, investigation of what can be done about arid conditions is naturally very attractive.

The nuclear research institute to be established at Geneva will give a number of non-atomic nations a chance to keep up with the nuclear procession in a mild sort of way. The idea came from America originally but the venture is participated in by only European nations and not all of them.

Operating laboratories with real international cooperation and support are somewhat different from the international unions in various fields which have been operating for a good many years. There is an International Council of Scientific Unions. There are many international conferences in a large number of scientific fields. These meet every few years to bring some of the scientists of various nations together to exchange information and to work out the rules and customs without which science in one nation or area would not be uniform with that in another.

In these international unions Russian scientists have sometimes participated, but most frequently they have been absent. There are sometimes tentative acceptances, hope that they would participate, but usually the Russian "no show."

If Russia accepts the Eisenhower proposal for participation in the development of peaceful uses for atomic energy, perhaps this effort could be entrusted to one of the United Nations organizations such as UNESCO that has developed experience in the handling of these international matters in science and technology.

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## • RADIO

Saturday, Feb. 13, 1954, 3:15-3:30 p.m. EST

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. E. Cowles Andrus, associate professor of medicine, Johns Hopkins University, and president-elect, American Heart Association, will discuss "How to Help Your Heart."

The magnetostrictive property of *nickel*—its ability to vibrate when excited with electricity—has led to the development of a new electronic machine tool capable of cutting intricate shapes in the hardest of materials.

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## MEDICINE

**Silver Stain Speeds Detection of Cancer**

► **CANCER** OF the uterus can be detected faster with a silver staining technique developed by Dr. Gardner Riley of the University of Michigan.

Dr. Riley uses silver carbonate, heretofore used to stain nerve cell elements. This stain shows up all cells in fluids placed under the microscope. It concentrates in the nuclei of cells, thus helping to show abnormal cells such as cancer cells.

It has been used to examine cells in vaginal fluid from 4,533 women. In 11, the silver-stained cells pointed to the probability of unsuspected cancer or of suspected cancer before a diagnosis was made by microscopic examination of the tissue itself.

The silver staining method is relatively simple and fast, but the stain is a delicate one requiring careful handling or it will make blobs that are no good for diagnosis. Dr. Riley's research is supported by the American Cancer Society.

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## SURGERY

**New Back Operation Saves Time and Money**

► A **NEW** operation for aching backs which gets patients out of the hospital in one week and back to work in two months may replace one in which the patient had to be in the hospital or a semi-invalid in a cast or brace for six months.

The operation was reported by Drs. Gerald G. Gill and Hugh L. White of San Francisco and Dr. John G. Manning of Pasadena, Calif., at the meeting of the American Academy of Orthopaedic Surgery in Chicago.

They use it for patients with the relatively common condition called spondylolisthesis, which is caused when the fifth lumbar vertebra at the base of the spine becomes displaced and slips forward, resulting in painful compression of nerve roots. The patient's first symptoms are an aching back and tenderness in the lower part of the back.

In the past, the patient had to undergo what is commonly known as a fusion operation to get relief.

In the new operation all of the bony structures pressing on the nerve roots and ligaments are removed. It is particularly useful in those patients who have been considered too old for the fusion type of treatment.

"While the length of time of follow-up in our patients has been relatively short, the longest case being three and one-half years, the results thus far have been most encouraging," the doctors said. "From the standpoint of the patient and, particularly, from the saving of his time and expense, there is a great difference when comparing the two methods of treatment."

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**ON TARGET**—Taken through the eyepiece of the Army's new range finder, this picture shows what a U. S. tank commander sees as he draws a bead on his target, an M-47 medium tank. The new range finder automatically feeds precise distance of the target and proper ammunition setting into the tank's 90-mm gun as soon as the target is lined up.

## OCEANOGRAPHY

**Money for Beachcombers**

► **BEACHCOMBERS ALERT!** There's money floating on the waves.

Oceanographer Dean F. Bumpus has set out 800 drift bottles worth one dollar apiece to finders south of Cape Hatteras, N. C.

All a finder has to do is send the post card in each bottle with the date and his location to the Woods Hole Oceanographic Institution, Woods Hole, Mass.

These are not the only "valuable" seafaring bottles. In a study of oil pollution on the high seas, British planes have been dropping plastic bottles in the sea off the coast of England.

The cards in the British bottles are worth about 35 cents in U. S. currency to the finder who fills them out.

For those hardy lovers of the sea who prefer a map to cash, the Hydrographic Office of the U. S. Navy sends out a pilot chart for every one of its returned cards.

The bottles are not a subsidy to beachcombers. They represent attempts to get more information about ocean currents and verify present charts of currents. Ship captains use the charts in planning the best courses to avoid sailing against a current.

William G. Watt, director of the division of maritime security of the Hydrographic

Office in Washington, said that the Navy receives an average of a card a day from all over the world.

The Navy makes available "bottle papers," small cards to go in bottles, to all ship captains. The captains then fill out the card and throw it overboard in a bottle whenever they feel like it.

Each captain gives the date, location and name of the ship when the bottle is set out. On the reverse side in six languages, the finder is asked to give his name, location and date and send the card to the Navy.

Mr. Watt said the Navy has no idea how many cards and bottles are set out each year, but the number is probably much larger than the number of cards returned.

Down on the North Carolina coast, Roger H. Taylor of Kitty Hawk has made a pretty good thing out of bottles. He once found 61 of the Woods Hole bottles in two days—a good cash crop for any beachcomber.

Woods Hole bottles set out off the Carolinas have sometimes drifted out to the Gulf Stream. Many months later they have been found off Ireland and France.

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## MEDICINE

## Cancer From Quid?

► ON TOP of reports blaming cigarette smoking as a cause of lung cancer comes an announcement that chewing tobacco and snuff have been found by one group of scientists to be associated with cancers of the mouth.

The announcement is made by the American Cancer Society. The finding is by Dr. George E. Moore, director of Roswell Park Memorial Institute here and Drs. Lester L. Bissinger and Elsa C. Proehl of the University of Minnesota Medical School, Minneapolis.

All men over 50 who registered at the University of Minnesota Hospital Tumor Clinic since 1951 and who had chewed tobacco 20 or more years were interviewed about their tobacco habits. The area served by the hospital has a large population of snuff and tobacco chewers.

The studies showed that mouth cancers usually developed only after 15 years or more of continuous exposure of the mouth lining. Many who had chewed tobacco less than this time had developed mouth sores and tissue changes (thickening and leukoplakia) which the scientists felt might become cancerous unless the tobacco users discontinued their habit.

A high percentage of those with mouth cancer reported that they had developed sores early in their habitation at the site where they held their quid.

This observation has been interpreted by the doctors as suggesting that perhaps these patients were unusually sensitive or allergic to tobacco.

Twenty-six of 40 men with mouth cancers were long-term tobacco or snuff chewers. Similarly, 18 of 23 patients with mouth leukoplakia, a condition which some clinicians consider pre-cancerous, were tobacco chewers.

Fewer patients in the same age group who had various benign diseases or cancers not associated with the mouth used chewing tobacco.

Cigarette, cigar and pipe smoking were not significantly associated with the development of mouth cancer. This study did not include lip cancer or cancer of the lung.

The scientists are now testing the ability of tobacco quids to produce cancers in the pouch of hamsters. The food pouches of these animals are lined with tissue similar to that of the mouth and are readily used to hold experimental quids.

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## METEOROLOGY

## Rain Making Questioned

► THROWING SILVER iodide at clouds from ground generators does not cause a single raindrop to fall, it appears from recent Australian experiments during which the number of rain-forming particles in the air were counted under various weather and wind conditions.

These experiments have added to the controversy over whether rain can be caused artificially by seeding clouds with silver iodide particles, now a multi-million dollar a year industry.

Silver iodide particles, the studies have shown, cannot be detected higher than 2,000 feet nor farther downwind than 10 or 12 miles from the generator. They also lose their activity at "an extremely rapid rate" in free air.

Weathermen attending the American Meteorological Society meeting in New York learned of the Australian experiments from Dr. E. G. Bowen, director of the Commonwealth's Radiophysics Laboratory in Sydney. The number of rain-forming nuclei, either silver iodide or other particles, found downwind from a silver iodide generator were measured by taking air samples at various heights and distances from the generator, then putting the samples in a super-cooled "cloud" in the laboratory and counting the number of drops formed.

The number of rain-forming nuclei dropped to the number normally found in

air, which is about one per quart, 10 to 12 miles downwind and 2,000 feet up from the generator.

The loss of activity, or decay rate, of the silver iodide was measured by throwing out a mixture of zinc sulfide, which does not decay with time, and silver iodide, then catching samples of air as before. Silver iodide, these studies showed, loses its activity by a factor of 10,000 times within 30 minutes.

Dr. Ben K. Seely of the New Mexico Institute of Mining and Technology helped to direct and perform the decay rate studies. Drs. F. J. Smith and A. J. Heffernon of the Radiophysics Laboratory in Sydney, Australia, conducted the experiments on the diffusion of silver iodide particles.

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## GENERAL SCIENCE

## Honorable Mentions In Science Talent Search

► HONORABLE MENTIONS in the Thirteenth Annual Science Talent Search were announced on Feb. 4. Girls number 52 of the 260 outstanding seniors in the list, and 208 are boys. This division was determined by the ratio of girls to boys who participated in the competition.

The 260 young people to whom Honorable Mention listing was given go to school in 149 communities, located in 38 states and the District of Columbia. They were chosen from among 16,344 entrants, 2,409 of whom completed the science aptitude examination, submitted recommendations and scholarship records and wrote reports on "My Scientific Project."

The 40 highest ranking boys and girls, winners of all-expense trips to Washington, were listed in last week's SCIENCE NEWS LETTER. (See p. 70.)

In the 12 preceding Science Talent Searches, most of the students named in the Honorable Mentions list have been offered scholarships, and many of those named this year will qualify for valuable scholarships and other financial aid in the colleges, universities and technical schools of their choice.

Students in the Honorable Mentions list invariably rank high in their high school graduating classes: 28% of the boys and 48% of the girls stood first, second or third in their high school classes.

The Honorable Mentions did not win their places merely by keeping their noses in books; without exception they show records of participation in extracurricular activities. Science clubs have attracted 199 of these students. Most of these clubs are affiliated with Science Clubs of America.

For a booklet containing the names and addresses of the Winners and Honorable Mentions, and details of the Thirteenth Annual Science Talent Search, send a three-cent stamp with a self-addressed envelope to Science Clubs of America, 1719 N St., N.W., Washington 6, D. C.

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## GERONTOLOGY

## Clues Point to Work Decline of Older Workers

► CLUES THAT point to slowing of productivity among our older workers are given editorially in the *Journal of the American Medical Association* (Jan. 16).

A fixed retirement age, it is pointed out, is "unprofitable for the employer, frustrating for the employed and eventually disastrous to the national economy."

Calling on firms to take as much pains over the problem of whom they will retire as they do in choosing whom to hire, the editorial gives the following ways to recognize when productivity of older workers starts to decline:

"Day-to-day observation by the employee's immediate supervisor is the commonest. Other clues are increasing absenteeism, a worker himself admitting that he is unable to keep up and requesting a modification of his work schedule, individual output records, reports from other employees, reports from the nurse that an employee has become a frequent visitor to the dispensary, and the finding of warning signs on a periodic physical examination."

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**AUTOMATIC PUNCH PRESS**—A forerunner to an automatic assembly machine, the work of the punch press is controlled by an electronic computer, which reads information on the size, number and location of holes to be punched from a perforated card. The techniques employed to make it automatic may also be applied to machines for drilling, riveting, etc., the General Electric engineers who developed the punch press state.

#### PHYSICAL CHEMISTRY

## New Atomic Clock

► AN "ATOMIC CLOCK" has been developed to measure reliably the age of 44,000-year-old relics to within 37 years.

Devised by Dr. James R. Arnold, assistant professor of chemistry at the University of Chicago's Institute for Nuclear Studies, the clock measures the strength of radioactive carbon 14 as the first step in finding the age of the sample.

Carbon 14 normally is found in all living things. After being formed, it decays at a definite rate—a fact that makes it useful as a tool for dating ancient objects.

The new "atomic clock" uses two photomultiplier tubes to watch for tiny flashes in a fluorescent solution containing a dissolved sample of the specimen to be dated. The photo tubes are so sensitive that they must be kept at food-freezer temperatures.

The liquid sample is housed in a four-inch long tube surrounded by a container of liquid mercury, which provides a compact shield against the background radiation produced constantly by cosmic rays.

When the photo tubes detect bursts of light in the solution, they amplify the light's energy and translate it into electrical impulses. The strength of these impulses is proportional to the intensity of the light flashes. Through an electronic system, the impulses are sorted out. Only the ones at the energy level of the radiation given off

by carbon 14 are counted. From this count, the sample's age can be determined.

The new atomic clock is an improvement on the original technique worked out in 1949 by Dr. Willard F. Libby, professor of chemistry at the University's Institute for Nuclear Studies. Dr. Libby's method does not date objects as old as does Dr. Arnold's technique, nor does it have the accuracy of the latter's.

Dr. Libby's method is reliable to about 25,000 years in history with a possible error of 120 years. Dr. Arnold has pushed the time back to 44,000 years and increased accuracy to 37 years. His system has a potential accuracy of 17 years, he told the Scintillation Counter Symposium in Washington.

Dr. Arnold's technique has not yet been applied to the dating of archaeological relics, or of samples of wood or petroleum, or items of geological interest. His method, he pointed out, holds promise for industry in investigations dealing with rusting, gasoline processes and nutrition.

Only small amounts of carbon 14 would be required using Dr. Arnold's technique.

The two-day conference was sponsored by the American Institute of Electrical Engineers, the Atomic Energy Commission, the Institute of Radio Engineers and the National Bureau of Standards.

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#### PHYSICS

## Topsy-Turvy Top Throws Scientists in Turmoil

► THE RED-AND-WHITE topsy-turvy top that tips over on its slender stem and spins "like a sleeper" has thrown scientists into a tizzy for an explanation.

The toy made its debut several years ago both in this country and abroad.

When not in action, it sits with its stem up in the air. If flipped over, it rolls back into this upright position. But when spun, the stem flies out and works its way under the top. It supports the spinning toy until the top nearly stops. The top then falls over and the stem bobs into the air as the rotation ends.

The tricky twistings of this turnover toy inspired a four-page article in the *American Journal of Physics* (Jan.). William A. Pliskin of Poughkeepsie, N. Y., declared in his article that sliding friction causes the toy top to up-end. He includes diagrams, algebra, trigonometry and vectors to prove it.

He admits that his explanation does not agree with the theory propounded by J. L. Synge, another author who set forth his views in *Philosophical Magazine* back in 1952. Mr. Synge claimed the instability of the top caused it to flip over, and that friction's role was trifling.

But Mr. Pliskin points out that his explanation agrees with the solution worked out independently by two other investigators, C. M. Braams and N. M. Hugenholz, both of whom declared their findings in a third physics magazine. Speaking of his own work, Mr. Pliskin states:

"This independently derived analysis shows that the force due to sliding friction is in such a direction as to result in a torque which causes the angular velocity components to vary in a way which necessitates the rising of the center of gravity."

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#### MEDICINE

## New Drug Succeeds As Heroin Antidote

► FIRST CASE, so far as is known, of a patient saved from heroin poisoning death by a relatively new drug, nalorphine, or Nalline, is reported by Dr. Murray Strober of Brooklyn, N. Y., in the *Journal of the American Medical Association* (Jan. 23).

The patient was brought to Kings County Hospital in an unconscious state and no longer breathing. She was put in a respirator but there was no improvement. She was then removed from the respirator and given artificial respiration manually and an injection of nalorphine into a vein. Within one minute she started to breathe, her pupils dilated, she rapidly became conscious and sat up.

Nalorphine, a chemical derived from morphine, has hitherto been reported useful as an antidote to morphine itself and to various other narcotic drugs.

Science News Letter, February 6, 1954

## SURGERY

## Urge Amputation at Knee Instead of Thigh

► WHENEVER POSSIBLE, leg amputations should be made at the knee joint rather than through the thigh, three Army surgeons urged at the meeting of the American Academy of Orthopaedic Surgeons in Chicago.

The Army surgeons are Col. Joseph W. Batch, Col. August W. Spittler and Capt. James C. McFaddin of Walter Reed Army Hospital, Washington, D. C.

They gave the following advantages of the knee amputation:

1. Since the thigh muscles are retained functionally, early fitting of an artificial limb is possible.
2. The knee stump assists both in the control of rotation as well as lifting of the artificial limb.
3. An excellent gait is obtained almost immediately.
4. Motion of the thigh is true hip motion and not a result of pelvic thrust.
5. Without the artificial limb, the amputee may kneel on a chair or on the floor in work or play.
6. Muscle and bone are not transected, thus minimizing the spread of infection after the operation.
7. The stump heals rapidly; is firm and insensitive.
8. An excellent fitting artificial limb is readily fabricated, which requires fewer adjustments and is superior to artificial limbs for higher levels of amputation through the thigh.

Science News Letter, February 6, 1954

## VETERINARY MEDICINE

## Distemper Virus Develops Into Several

► JUST AS human influenza has three virus types to cause it, with new strains developing from time to time, so the similar disease in dogs, canine distemper, apparently has developed more than one virus to cause the disease.

Studies suggesting this are reported by Dr. N. M. Larin of the Canine Research Station of the Animal Health Trust, Newmarket, England, in *Nature* (Jan. 23).

Vaccines against distemper may need to be changed to include the new strains, just as vaccines against human 'flu have needed such changes.

Dr. Larin reports a study of 23 strains of distemper virus isolated from epidemics and sporadic cases in various parts of Britain during 1952-53. Their behavior in ferrets, he found, was so strikingly different as to justify grouping them into groups A, B and C strains.

Sickness with strains of group A lasted six to 14 days, while group B strains caused sickness lasting two to six weeks and group C strains caused sickness for three to 12 weeks.

The majority of ferrets sick with Group A strains had mouth sores, conjunctivitis and diarrhea, but did not lose their appetites until the last day or two before collapse and death. Loss of appetite occurred frequently in sickness with groups B and C strains, but the other symptoms developed only occasionally.

"It appears," Dr. Larin states, "that progressive and continuous changes have been occurring in the strains of distemper virus. The differences in the strains are sufficiently great to assume the plurality of virus and to warrant a periodic revision of components in the immunizing materials in order that the strains used may closely resemble the current strains infecting the dog."

Science News Letter, February 6, 1954

## MEDICINE

## Sucking Alkaline Tablets Relieves Ulcer Symptoms

► GOOD RESULTS in ulcer symptoms from the sucking of alkaline tablets are reported by Drs. A. H. Douthwaite and M. G. Thorne of Guy's Hospital, London, in the *British Medical Journal* (Jan. 23).

A hint that these tablets may even prevent further trouble from duodenal ulcers appears in the doctors' carefully worded report, as follows:

"Their regular use in the symptom-free patient already seems to reduce the tendency to relapse. It would be unwise to put the case any more strongly than this for the present. It is hoped that significant results will be available after a five-year follow-up period."

The tablets contain milk solids combined with dextrans and maltose, magnesium trisilicate, magnesium oxide, calcium carbonate, magnesium carbonate and peppermint flavoring.

One of these tablets, if lodged between gum and cheek, takes 20 to 30 minutes to dissolve. Its food value is about 11 calories.

After good results from continuous sucking of these tablets in tests made during the digestion of gruel test meals, the two doctors tried them on 12 patients who were up and about and eating ordinary meals except that solid food was minced. In two cases, the patients were eating ordinary, unminced food. Tests were made on two days, during one of which the patients sucked dummy tablets containing no alkaline chemicals.

In every case the alkaline tablets brought a "considerable" neutralization of the acid in the stomach, which is generally considered desirable in treatment of ulcer patients. The dummy tablets did not do this. In some experiments sucking only one tablet an hour was effective, probably because the food eaten also reduced the acidity of the stomach contents.

Although patients could suck four tablets in an hour, the doctors do not think there is any danger of too alkaline a state developing if the daily dose does not exceed 15 tablets.

Science News Letter, February 6, 1954

# IN SCIENCE

## METEOROLOGY

## Air Pressure Jumps Spot Oncoming Tornadoes

► APPROACHING TORNADOES can sometimes be spotted using a new, very sensitive instrument, four Lamont Geological Laboratory scientists reported to the American Meteorological Society meeting in New York.

The device, a microbarovariograph, spots very small changes in air pressure. Some of these changes, or jumps, were associated with tornado activity more than 90 miles away from Oklahoma City where the instrument was installed, they reported.

A chain of such devices would give observations "of great value," Drs. Maurice Ewing, Frank Press, Richard Rommer and William Donn believe.

Science News Letter, February 6, 1954

## PHYSICS

## Double Atomic Birth Gives Atomic Particles

► DISCOVERY OF an artificial "twin" birth process of still puzzling particles within the atom has resulted from about eight months of operating the giant cosmotron of the Brookhaven National Laboratory on Long Island.

Dr. R. P. Shutt told the American Physical Society meeting in New York that it is now known that two particles, the relatively heavy hyperon and the lighter K particle, appear together when a proton smashes into a negative pi meson.

Heretofore, when the production of these very short-lived particles was known only from cosmic rays, physicists were troubled by their lifetime that they considered too long, even though it was only one ten-billionth of a second. The actual length of existence of the particles is made plausible by the production of the two particles in the same act.

Immense energies of the particles accelerated in the cosmotron made possible the artificial duplication of what the cosmic rays can do. The protons within the giant machine had energies of two and a half billion electron volts, while the pi meson was rated at one and a half billion electron volts.

Only several hundred K particles have ever been discovered in cosmic rays and they have never been found in pairs. The artificial production was detected by photographs of the tracks of the particles produced in a cloud chamber.

The K meson is 900 to 1,400 times the mass of the electron and the hyperon is 2,200 electron masses.

Science News Letter, February 6, 1954



# CE FIELDS

## ASTRONOMY

### Find New "Yardstick" For Galactic Distances

► A NEW "yardstick" for measuring the distances to other star systems, or galaxies, beyond the Milky Way is being investigated by Drs. G. de Vaucouleurs and C. S. Gum of the Canberra and Commonwealth Observatory, Mt. Stromlo, Australia.

Luminous hydrogen gas surrounding some nebulae is in the shape of rings or partial rings. In six different galaxies, including our own Milky Way, they find that the largest of these rings has approximately the same diameter. This, they point out, is "striking" because the galaxies represented in the six include both spirals, great pinwheels of stars such as the Milky Way and the Andromeda Nebula, as well as irregular, giant and dwarf systems.

Although the rings are not found in all galaxies, when they do occur, they offer an "excellent distance indicator," the two astronomers conclude. Examples of ring-shaped systems in our own galaxy are found in the constellation of Orion, the giant hunter, and Scorpius, the scorpion.

The diameters of the ring systems average about 85 parsecs, Drs. de Vaucouleurs and Gum report in the *Observatory* (Aug., 1953). One parsec is about 19,160,000,000 miles. If the largest ring-shaped object in other extra-galactic systems can be considered to have approximately this same, 85-parsec diameter, then the distance to that galaxy can be computed from its apparent diameter.

Science News Letter, February 6, 1954

## MEDICINE

### Blame Backache on Hardening of Arteries

► BACKACHES IN some cases are due to artery disease, Dr. George S. Phalen of the Cleveland Clinic, Cleveland, Ohio, declared at the meeting of the American Academy of Orthopaedic Surgeons in Chicago.

He compared the condition in which the patient has pain in the low back, hip or thigh with the cramp-like pain in the calf which comes on after walking a variable distance and is relieved promptly by standing still.

The calf pain is almost certain to be due to some interference with blood circulation of the lower leg, often the condition doctors call arteriosclerosis obliterans.

"Pain in the lower back, hip and thigh may be due to occlusive vascular disease such as arteriosclerosis obliterans," Dr. Phalen declared. "Patients who have this type of intermittent claudication will complain of acute cramping in the region of

the right hip, coming on after walking a short distance. This cramping pain becomes so severe that the patient must stop and stand still for a few minutes before the pain will be relieved sufficiently so that he can walk another short distance.

"The cramping pain in the muscles is due to the fact that these muscles are not receiving enough blood to enable them to carry out the work required of them. This type of pain always disappears with rest and always recurs with activity.

"It is imperative that the status of the circulation in the lower extremities be checked carefully in all patients complaining of low back, hip or thigh pain. Patients who have intermittent claudication of the hip have frequently been treated for other orthopaedic and neurosurgical conditions which they did not have, such as a protruded intervertebral disc or arthritis of the hip joint."

Dr. Phalen explained that a dye, opaque to the X-ray, may be injected directly into the aorta, the large artery leading from the heart. This will permit the taking of X-ray films which outline the blood vessels in the pelvis and legs. By means of these films, the exact location of the block in the arteries may be demonstrated.

Science News Letter, February 6, 1954

## SURGERY

### Chest Muscle Graft Aids Arm Weakened by Polio

► BY GRAFTING a pectoral muscle from the chest to the biceps, a group of San Francisco surgeons are giving polio patients arm strength and ability to move paralyzed elbows.

The operation and its results were reported by the group, Drs. E. R. Schottstaedt, Loren J. Larsen Jr. and Frederic C. Bost, at the meeting of the American Academy of Orthopaedic Surgeons in Chicago. Most of their work was done at Shriners Hospital, San Francisco.

Their first muscle transplant was done on an eight-year-old boy who, because of a palsy condition, was unable to bend his elbow. After a chest muscle was grafted to the biceps tendon, he was able to lift a three-pound weight throughout a full range of motion and, by resorting to trick motion, could lift a five-pound weight.

Best result, the surgeons said, was on a patient whose elbow-bending muscles were paralyzed by polio. As a result of the muscle grafting, this patient can lift a weight of five pounds throughout complete range and can hold eight pounds at 90 degrees, which is the point of maximum muscle efficiency.

In some cases results were not so good.

The transplanted muscles, even when effective, never equal in power the muscle being replaced or the transplanted muscle in its normal location. But in successful cases, patients can feed and dress themselves and care for many of their other daily needs even if they do not have great strength.

Science News Letter, February 6, 1954

## METEOROLOGY

### Winds Rush 220 MPH 50 Miles Overhead

► HIGH-ALTITUDE WINDS sweeping as fast as 220 miles an hour about 50 miles above the earth's surface have been charted from photographs of meteor trails, Dr. Fred L. Whipple of Harvard College Observatory reported to the American Meteorological Society meeting in New York.

These winds "change rapidly with altitude" at 50 to 70 mile heights, he said, the changes being so "surprisingly high" that a new explanation of the source of such wind energy must be found.

Photographs of identical meteor trains were made with wide-eyed, fast-reacting Schmidt and Baker-Super-Schmidt telescopes at two or more separated stations. From them the average wind speed at 50 to 70 miles above the earth was calculated to be 150 and 112 miles an hour, respectively.

A meteor train that is nearly horizontal, Dr. Whipple said, shows much smaller wind changes with distance than the trails of meteors that plunge through the earth's atmosphere at an angle. About half of the energy of motion of the high-altitude winds, he suggests, is contained in large-scale, systematic motions and the other half in eddies two to six miles deep and about 30 miles across.

Wind speeds of approximately 120 miles an hour at about 66-mile heights were also reported by Dr. N. C. Gerson of the Air Force Cambridge Research Center, Mass. He analyzed reports of amateur radio operators, or hams, who talked unusually long distances on the 50 megacycle band, to find how fast a layer of the earth's radio-reflecting roof known as sporadic E was moving.

Both of the wind-speed values reported agree with velocities obtained by radar-meteor and other methods.

Science News Letter, February 6, 1954

## MEDICINE

### Tests Show Cortisone Reaches Spinal Fluid

► CORTISONE, adrenal gland hormone famous as a remedy for arthritis and other diseases, normally gets into the spinal fluid, it appears from tests made by Drs. D. N. Baron and Denis Abelson at Middlesex Hospital Medical School, London. Dr. Abelson is now at Yale University School of Medicine, New Haven, Conn.

The spinal fluids they examined came from patients having spinal punctures done and fluid removed in the course of neurological examinations. Paper chromatographic methods were used to detect the presence of cortisone and hydrocortisone.

The "provisional identification" of cortisone in spinal fluid is important, the scientists point out in *Nature* (Jan. 23), because some workers have failed to find these hormones in normal blood plasma.

Science News Letter, February 6, 1954

## MEDICINE

# Help Your Heart Beat True

Valentine's Day may bring you many greeting hearts but none so strong as the fist-sized pump in your chest. Disease stops many but most work faithfully on.

By JANE STAFFORD

► VALENTINE'S DAY brings a shower of hearts, some comic, some romantic. It is a day for lovers to check the state of their hearts, and it is a day when all of us might think about checking the state of the wonderful muscle that beats true as long as it possibly can.

For while hundreds of thousands of hearts weaken and die each year, the real miracle is that so many go on for so long. True, diseases of the heart and circulation killed 771,000 Americans in 1952, latest year for which figures are available from the National Office of Vital Statistics. But some 150,000,000 Americans lived on.

Their hearts were strong enough to go on beating 72 to the minute every minute of every day and night. As a pump the heart has an efficiency that any manufacturer of pumps or motors would be glad to achieve with his mechanical device. To equal the heart's efficiency as a motor, a gasoline engine such as the one in your car would have to be capable of running 1,000,000 miles without attention.

Every day the normal human heart pumps from nine to ten tons of blood, driving it through miles of arteries and veins. In the biblical lifespan of three score years and ten, which many persons in America now outlive, the heart delivers nearly three billion thrusts to pump more than 40,000,000 gallons of blood.

## Rest Period for Heart

All this power is housed in an organ that measures on the average 5 by 3½ by 2½ inches in a grown person, and weighs about three-quarters of a pound.

How does this little pump achieve so much? Two things undoubtedly help: 1. The kind of muscle from which the heart is made. 2. Rest periods.

The fibers of the heart muscle criss-cross in many layers running in different directions. This gives strength in the same way that laminated material gets strength even when made of many thin layers. It gives the heart more strength than any other muscle in a man's body. Only one human muscle has more power. That is the contracting uterus in a woman's body when she is giving birth to a baby.

And the heart does rest, even when you are working. With every beat, the heart contracts to force the last drop of blood out of its hollow chambers, called ventricles.

This contraction lasts for three-tenths of a second. Then it relaxes, for five-tenths of a second. Someone has figured that the heart, because of these rest periods, actually works only eight hours out of each 24.

In spite of its rest periods and great strength, this marvelous pumping muscle does get out of order. Some of its troubles come from the vein and artery pipes through which it must pump all those gallons of blood, and some come because its valves are faulty to start with or become faulty through disease.

There are 20 forms of heart disease. The three that account for about 90% of all cases are: 1. coronary heart disease, resulting from hardening and narrowing of the coronary arteries that carry blood to nourish the heart muscle itself; 2. hypertensive heart disease, resulting from high blood pressure, or hypertension as doctors call it; 3. rheumatic heart disease, which follows rheumatic fever, is a leading fatal disease among those aged five to 19, and affects some 1,000,000 Americans.

## Disease Outlook Hopeful

The causes of these three conditions are unknown. There is, however, hope that both causes and means to control the conditions will be discovered. For example, it is now known that prompt and efficient treatment of strep. sore throats with penicillin may prevent development of rheumatic fever. Children who come through one attack of this sickness can, in many cases, be protected from further, heart-damaging attacks by preventive treatment with penicillin or other modern streptococcus germ-fighting medicines.

Surgical procedures, from blue-baby operations to talcum powder operations, are saving many hearts. New drugs, new tools to diagnose and study heart and blood vessel diseases are being developed. Hearts are being saved and more will be saved as scientists learn more through research, such as that supported by the American Heart Association. This association hopes to get \$11,000,000 this year to further its heart-saving work.

You can help by giving, and you can help by learning these five facts:

1. Some forms of heart disease can be prevented. A few can be cured.
2. All heart cases can be cared for best if diagnosed early.
3. Almost every heart condition can be

helped by proper treatment.

4. Most heart patients can keep on working—often at the same job.
5. Your "symptoms" may or may not mean heart disease. Don't guess—don't worry. See your doctor and be sure.

When you do see your doctor, you will find that he will follow several procedures to check the state of your heart. First will be your history. Scarlet fever or rheumatic fever in childhood, for example, puts the doctor on guard for defects in the heart's valves, to be checked later in the examination.

By sight, touch, and hearing, the doctor will check the quality, rate and rhythm of pulse, the many sounds made by the closing of the heart's valves, and the state of the tiny blood vessels in the eye's retina, often clue to damage elsewhere in the arteries.

The familiar rubber cuff and mercury column instrument will tell of the blood pressure. The electrocardiograph, by means of electrodes attached to the body, picks up electrical impulses from the beating heart and gives pinpointed information about irregular heart beats and the exact location and extent of damage to the heart muscle following a heart attack.

The fluoroscope and X-ray picture show the doctor the shape of the heart, its position and signs of enlargement or other abnormalities.



**HEART CHECK**—Looking like a modern cupid, this young lady appears confident as well as fascinated as she awaits a heart check by her doctor.



**HEART MODEL**—To demonstrate how a heart works, doctors can use this teaching model of a heart.

Finally, or earlier in the examination, there may be laboratory tests of blood and urine and investigation of the condition of liver, lungs and kidneys, since heart trouble may often be accompanied by disorders of other parts of the blood circulation system.

Science News Letter, February 6, 1954

#### GEOCHEMISTRY

### Scientists Find How Mercury Ore Deposited

► EXACTLY HOW nature deposits mercury ores has been discovered by two geologists at the University of California at Los Angeles. This promises to aid in discovering new sources of this strategic mineral.

Frank Dickson and Dr. George Tunnel have established that cinnabar, which is mercuric sulfide and the chief mineral source of mercury, is precipitated when solutions containing mercury sulfide and sodium sulfide are neutralized or diluted with water.

Evaporation actually increased the amount of dissolved cinnabar, although continued evaporation eventually precipitated the mercury. This was not in the form of cinnabar, however, but in that of an easily redissolved double salt.

This work is the first to definitely establish the precipitation curve of cinnabar at a fixed temperature. The study is one step in a series tracing the course of mercury compounds in naturally occurring solutions to their final ore deposit form.

Further improvements in the understanding of the origin of mercury deposits are expected to result from the combined field and laboratory studies of economic geologists and geochemists. The study is being performed under a contract with the Office of Naval Research.

Science News Letter, February 6, 1954

#### CHEMISTRY

### Largest Artificial Quartz Crystal Weighs 2 Pounds

See Front Cover

► THE LARGEST man-made quartz crystal, shown on the cover of this week's SCIENCE NEWS LETTER, is unusually clear and weighs over two pounds.

The record-breaking crystal was grown by Brush Laboratories, Cleveland, Ohio, on a natural quartz seed plate less than one-twentieth its size, and took 78 days to reach its final dimensions.

Pure quartz crystals grown under exact conditions will, it is hoped, give even more perfect control of radio and TV circuits and astronomical clocks than scarce imported natural crystals.

Very fine natural quartz imported from Brazil furnishes the crystals now depended upon for high precision instruments.

The largest synthetic crystal was grown at 660° Fahrenheit, with the material compressed in an autoclave at a pressure of 5,000 pounds per square inch. Water containing 18% sodium carbonate (common washing soda) was the medium for growing the crystal.

Science News Letter, February 6, 1954

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# WHERE TO RETIRE TODAY —AND ENJOY IT

by Norman D. Ford

If there is anything I have found out in traveling up and down this country and throughout the rest of the world, it is this: It costs less to retire than you may think it does—*provided you know how to discover those places where it costs less to live the kind of life you like.*

As founder of the Globetrotters Club, I made it my business to find low-cost beauty spots all over the world. Right here in the U. S., I found places where the cost of living is surprisingly low — and you can get a part-time or seasonal job if you must pad out your income. Here are just a few of them.

## Do you know where to find

- the greatest retirement bargain in Florida?
- the most beautiful town in all California?
- the three top-notch retirement towns in the Southwest?
- the one place in America where university experts have found the most healthful climate in the world?
- that marvelous Maine island, where it's 10-15 degrees warmer in winter than on the mainland, and living costs are so low they attract many who otherwise could not afford to retire?
- a health spa, with wonderful facilities for recreation, surrounded by a national park?
- the ideal island for retirement in the South, with cool summers and warm winters?
- the most "cultural" small town in America, with a Little Theatre, art and music clubs, a cosmopolitan atmosphere?

Of course, these are only a handful of the hundreds of beauty spots, hideaways, and larger communities in the U. S., where you can retire now on little money and enjoy yourself completely.

And in the rest of the world, there are hundreds more besides. Just a few of them:



NORMAN D. FORD

southern Gulf Coast of Florida for \$3,000?

Where can I find a clean, friendly city with a climate that's mild and it's sunny the year around?

I have a highly strung, nervous type of constitution; I also suffer from pleurisy. I would like to retire in a medium-sized city with plenty of cultural opportunity. What can you suggest?

Is it true that you can live like a king in Majorca for less than \$35 a week for two? How do you reach Majorca?

Do you know of any city in Mexico where prices have not risen, and I can find other retired Americans?

The facts to answer these typical questions and hundreds more are given in Norman D. Ford's wonderful books, "Where to Retire on a Small Income" and "Bargain Paradieses of the World."

- *The Azores or the Canaries*—tropical flowers, sandy beaches, and the charm of Old Spain are combined here—with rents of about \$20 a month, groceries for a couple at \$10 a week, and servants \$5 a month each.
- *The lotus-covered mountain lakes of Kashmir*, where a furnished houseboat with four turbanned servants rents for \$70 a month. Total costs for a couple run about \$175 a month—in the most beautiful spot on earth.
- *The South Seas?* Tahiti has found out about the Yankee dollar. But there's brilliant Sigatoka Beach at Suva or reef-girt Norfolk or Lord Howe Island, the Bargain Paradieses of the South Seas today.

So I say again — you can retire now, while still young enough to enjoy it — if you know where it costs less to live the kind of life you like.

—O—

(In the next column, read about two books by Norman D. Ford which tell you just this.)

## TO RETIRE YOUNG ENOUGH TO ENJOY IT

—read these books by Norman D. Ford

### WHERE TO RETIRE ON A SMALL INCOME

This book selects out of the hundreds of thousands of communities in the U. S. and its island territories only those places where living costs are less, where the surroundings are pleasant, and where nature and the community get together to guarantee a good time from fishing, boating, gardening, concerts, or the like. The book never overlooks the fact that some people must get part-time or seasonal work to pad out their incomes.

It covers cities, towns, and farms throughout America—from New England south to Florida, west to California and north to the Pacific Northwest. It includes Hawaii, Puerto Rico, and the American Virgin Islands. Some people spend hundreds of dollars trying to get information like this by traveling around the country. Frequently they fail—there is just too much of America to explore.

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# Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N. Street, N. W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

**BALI: TEMPLE FESTIVAL**—Jane Belo—*Augustin*, Monographs of the American Ethnological Society, XXII, 70 p., illus., \$2.75. Based on material collected from 1931 to 1939 before the Japanese occupation.

**BESSEL FUNCTIONS AND FORMULAE**: Extracted from British Association Mathematical Tables, Volume X Bessel Functions, Part II Functions of Positive Integer Order—compiled by W. G. Bickley—Cambridge University Press, 40 p., paper, 75 cents.

**BLAZING ALASKA'S TRAILS**—Alfred Hulse Brooks—University of Alaska and Arctic Institute of North America, 528 p., illus., \$4.50. This book was written a generation ago, 1914 to 1922, and the author died in 1924. Because of its great importance it is now being published under the auspices of these two institutions.

**BREAKING PATTERNS OF DEFEAT: The Effective Readjustment of the Sick Personality**—Richard L. Jenkins—Lippincott, 270 p., illus., \$6.75. The successful individual, the author points out, establishes a balance between the needs of his inner self and the needs of society. Out of balance, he becomes tense or maladjusted.

**THE CHILD, HIS PARENTS AND THE NURSE**—Florence G. Blake, foreword by Adrian H. VanderVeer—Lippincott, 440 p., illus., \$5.00. A textbook for a course in nursing care of children, this volume is also intended for parents.

**CONTRIBUTIONS TO THE ANTHROPOLOGY OF THE CAUCASUS**—Henry Field—*Peabody Museum*, Papers Vol. XLVIII, No. 1, 154 p., illus., paper, \$6.50. Reporting anthropological data obtained within the USSR in 1934 with the "utmost courtesy" and facilitation on the part of Russian scientists. The Caucasus has been occupied by man continuously since palaeolithic times and it was there that Prometheus was, according to legend, bound to a rock for having stolen fire from heaven.

**DIZZINESS: An Evaluation and Classification**—David Downs DeWeese—Thomas, 80 p., illus., \$2.75. A study of different types of dizziness and their causes, which will aid the physician in diagnosis and treatment.

**EVOLUTION AND GEOGRAPHY: An Essay on Historical Biogeography With Special Reference to Mammals**—George Gaylord Simpson—*Oregon State System of Higher Education*, 64 p., illus., paper, \$1.00. Answering in non-technical language the question, "What lives where?"

**GLOBAL EPIDEMIOLOGY: A Geography of Disease and Sanitation: Volume Three, The Near and Middle East**—James Stevens Simmons and others—Lippincott, 357 p., illus., \$12.00. A brief but comprehensive summary of the disease hazards of Near and Middle East countries, the third of a series of five volumes on international health.

**HEADLINE DESIGN: A Handbook**—Kenneth B. Butler—*Butler Typo-Design Research Center*, 95 p., illus., paper, \$3.75. A handbook that attempts to be practical as well as creative, and to enable the editor or layout man to improve his publication.

**AN INTRODUCTION TO LABORATORY TECHNIQUE IN BACTERIOLOGY**—Max Levine—Macmillan, 3d ed., 413 p., \$4.50. An exercise is included for preparation of digests in case they become unavailable in time of emergency.

**LINEATION: Review of Literature 1942-1952**—Ernst Closs—*Geological Society of America*, 14

p., illus., paper, 25 cents. A critical review and annotated bibliography on this subject was published in 1945. Since then 142 papers by 100 authors have been published. This review brings the bibliography up to date.

**THE LIVES OF WILD BIRDS**—Aretas A. Saunders—*Doubleday*, 256 p., illus., \$3.50. Showing the bird lover how he can make his bird watching contribute to science.

**THE MOTION OF THE HEART: The Story of Cardiovascular Research**—Blake Cabot—Harper, 173 p., \$2.00. A science writer gives an account of the various lines along which research is being done to attack our most important killer.

**NEW GOALS IN POLICE MANAGEMENT**—Bruce Smith, Ed.—*American Academy of Political and Social Science*, The Annals Volume 291, 220 p., paper, \$2.00.

**ORGANIC CHEMISTRY: A Brief Course**—Robert Ward Getchell—McGraw-Hill, 278 p., \$4.00. A textbook to serve the student for whom organic chemistry is a cultural tool rather than professional preparation.

**PSYCHOLOGY APPLIED TO HUMAN AFFAIRS**—J. Stanley Gray—McGraw-Hill, 2d ed., 581 p., illus., \$6.00. A classroom textbook not intended for "self-education," reporting facts about how psychology has been used in more than 20 fields. Specialists have contributed chapters on specific applications.

**PUBLIC ACCOUNTABILITY OF FOUNDATIONS AND CHARITABLE TRUSTS**—Eleanor K. Taylor—*Russell Sage Foundation*, 231 p., \$3.00. An analysis of state and federal legislation and court decisions affecting foundations.

**TELEVISION WORKS LIKE THIS**—Jeanne and Robert Bendick—*Whitney House*, rev. ed., 64 p., illus., \$2.25. Explaining in brief text and clear drawings not only the technical workings of a television receiver, but the behind-the-scenes details of putting a program on the air.

**VIRGINIA MINERAL LOCALITIES**—Richard V. Dietrich—*Virginia Polytechnic Institute*, Bulletin, Engineering Experiment Station Series No. 88, 57 p., paper, 50 cents. Compiled mainly from publications and collection lists.

Science News Letter, February 6, 1954

## MEDICINE

### Mumps Skin Test Material Available

► **NEW MATERIAL** for making skin tests for mumps is now available. Called an antigen, it is made at Lederle Laboratories, Pearl River, N. Y., from allantoic fluid of chick embryos infected with mumps virus.

It will have three uses: to determine whether a patient with mumps-like symptoms could be getting mumps or something else; to diagnose mumps when there is no swelling around the ears but other organs, such as sex glands and pancreas, are affected; and to determine whether a person exposed to mumps is susceptible to the disease and may need mumps vaccine to protect him.

Science News Letter, February 6, 1954

## CHEMISTRY

### Mystery Element Stands Very High Temperatures

► **DON'T WORRY** about the amount of hafnium in your zirconium.

Tests on pure isotopes of these twin elements just completed show that heat-resistant ceramics made of pure hafnium can take 1,700 degrees Centigrade without cracking up, while similar products made from pure zirconium go to pieces at about 1,000 degrees. Zirconium is the metal obtained from zircon, sparkling substitute for diamonds.

Wanted for the framework of nuclear reactors, zirconium is being studied for heat resistance by the ceramics department of Oak Ridge National Laboratory, Oak Ridge, Tenn., operated by Union Carbide and Carbon Corporation for the Atomic Energy Commission. Hafnium is a naturally occurring twin element whose compounds are so much like those of zirconium that their separation is almost impossible.

The question whether hafnium is harmful in the mixture has been answered by the new knowledge gained from the pure isotopes. Hafnium is not harmful. It may help in processes stabilizing zirconium for work in hot spots.

Science News Letter, February 6, 1954

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## ZOOLOGY

# NATURE RAMBLINGS



Opossum

► WHEN DANGER threatens, the opossum falls into a limp, lifeless heap. He hopes, by playing dead, to make himself unappetizing to even the hungriest of his enemies.

This stratagem shows a poor understanding of animal psychology, especially of hungry animal psychology, because opossums are rarely known to attain a ripe old age. "Playing 'possum" is a one-sided game in which 'possum is loser and winner takes all.

Hazards start early in the life of the opossum. Opossums are marsupials, that is, they carry their young in a pouch in the manner of kangaroos. They are the only marsupial native to this country. Nature has devised a ruthless aptitude test for newborn opossums, to fail which is fatal. They must find and climb into the pouch where warmth and food are waiting, or die.

The contestants in this life-and-death "entrance exam" are pitiful creatures. At birth opossums are blind, deaf, and incredibly tiny. Fifteen of them weigh about an ounce. Each baby opossum is smaller than a bumblebee.

The entrance to the pouch, hidden amongst the hairs of the mother's abdomen, is small and hard to find. The young opossum must grope blindly until he reaches the opening, and then pull himself up and in.

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But gaining the sanctuary alone is not enough; he must get there ahead of his brothers and sisters, because there may not be enough teats to go around. There may be as many as 18 young in a litter and only 12 teats. The first dozen fasten themselves to a teat and do not let go until weeks later when they have grown ten-fold. The six laggards who finish last in the race for the pouch are doomed to death by starvation.

The lucky opossum that grows to full stature is about the size of a house cat. To reach this size, he has had to evade foxes, wolves, wildcats, owls, hawks, and all the creatures, including man, who like to lunch on young opossum.

However, not all opossums are that large. There is one kind of miniature opossum that lives in South America. They sometimes arrive in this country as unwilling stowaways in bunches of bananas. Presumably, when the bananas were harvested, the pilfering opossum "played 'possum," and before he knew what had happened, he found himself en route to foreign parts.

For the 'possum it is just one more perilous journey; awaiting him at the end of it, in all probability, lurks the store cat.

Science News Letter, February 6, 1954

## MEDICINE

### ACTH Saves Lives in Rare Operation Complication

► ACTH, PITUITARY gland hormone first famous as an arthritis remedy, has saved lives of patients threatened by a rare but almost always fatal complication following major operations. Drs. John V. Prohaska, Michael C. Govostis and Matthew Taubehaus of Chicago report in the *Journal of the American Medical Association* (Jan. 23).

The complication is a colon inflammation known as pseudomembranous enterocolitis. It is characterized by fever, increase in white blood cells, diarrhea, weakness, lethargy, abdominal pain, tenderness, gaseous distention and paralytic ileus.

The real cause of the condition is not known. The fact that it occurs rarely makes it difficult to diagnose. Heretofore there has been no known treatment.

The Chicago doctors report immediate, complete and in one case "spectacular" recovery of three gravely ill patients treated with ACTH. In contrast, four other patients who suffered the same complication but did not get ACTH died. It was after seeing these patients die that the doctors decided to try ACTH.

Why this hormone is effective in this condition is not known. The doctors are exploring the possibility that the disease is one of tissue necrosis resulting from antigen-antibody reaction.

They warn that intestinal inflammation due to bacteria should be ruled out before ACTH is given, because any bacterial disease would be markedly aggravated by the hormone.

Science News Letter, February 6, 1954

## GENERAL SCIENCE

### Science Service Director Given Education Award

► WATSON DAVIS, director of SCIENCE SERVICE, was presented a Bausch & Lomb award for significant achievement in the field of science education.

The presentation, in the form of an inscribed binocular, was made by George E. Lawrence of the Bausch & Lomb scientific instrument department at the annual dinner of the Washington Academy of Sciences on Jan. 22.

Science News Letter, February 6, 1954

## GEOPHYSICS

### Plan Eclipse Flight to Spot "Northern Lights"

► THE "NORTHERN lights" may be seen next June, for the first time during the day, if plans for airplane flights to the auroral zone during the solar eclipse are successful.

Dr. Sydney Chapman of the Geophysical Institute of the University of Alaska at College revealed to a meeting of the National Academy of Sciences in Washington that the Royal Air Force was planning to send several planes into the Greenland-Iceland region at the time of the June 30, 1954, eclipse of the sun.

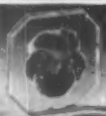
Flying in the auroral zone above the level of most clouds when the sun's bright light is suddenly shut off by the moon, scientists who will be aboard the planes hope they will be able to catch the first daytime glimpse of the aurora borealis. Dr. Chapman believes that the aurora is probably much brighter during the day than at night, since the shimmering curtains of light are thought to be caused by radiation and particles poured out by the sun.

On occasion, scientists have spotted the brilliant auroral patterns during the twilight period. The sun's bright light, however, eliminates any chance of seeing the northern lights during the daytime, except when the path of the solar eclipse happens to hit the auroral zone.

Scientists at Cornell University, Ithaca, N. Y., Dr. Chapman reported, are trying to detect the daytime aurora by use of radar.

Science News Letter, February 6, 1954

## Flower Containers and Tiles PRESERVE Real FLOWERS in NEW CRYSTAL PLASTIC



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## Questions

**ASTRONOMY**—What new "yardstick" for measuring galactic distances has been reported? p. 89.

□ □ □

**GENERAL SCIENCE**—What promising international organizations are now functioning? p. 84.

□ □ □

**GERONTOLOGY**—What clues point to productivity decline of the elderly? p. 86.

□ □ □

**MEDICINE**—What new link of cancer and tobacco is now suspected? p. 86.

How can ulcer symptoms be relieved? p. 88.

□ □ □

**METEOROLOGY**—What are believed to be chances of making rain from ground generation of silver iodide? p. 86.

□ □ □

Photographs: Cover, Brush Laboratories; p. 83, Radio Corporation of America; p. 83, American Locomotive Company; p. 87, General Electric Company; p. 90, National Heart Institute; p. 96, Bakelite Company.

### FORESTRY

## Squirrels Are Menace To Pine Reforestation

► **SQUIRRELS** ARE a serious menace to the redevelopment of ponderosa pine forests in the West after timber cutting, A. E. Squillace, U. S. Forest Service, has found.

Working at the Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Mont., he has discovered that squirrels removed between 77% and 89% of the available seeds in the years 1951, 1952 and 1953 in a test timber stand.

In addition to removing the maturing crop of seeds each year, squirrels also injured the conelets which are developing seeds for the following year.

Mr. Squillace said timber growers should consider the possibilities of controlling squirrel populations in ponderosa forests to maintain a steady production of trees.

Science News Letter, February 6, 1954

## New Hearing Aid Without Tubes

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### PUBLIC HEALTH

## Pale Oranges Foreseen

Food and Drug Administration holds hearings on proposals to ban use of three coal-tar colors that are tints for foods, cosmetics and drugs.

► **CHILDREN SICK** after eating too much Halloween candy, oranges consumers refuse as less tasty because their color is not orange, milady's cheeks and lips decorated with less pleasing hues, pale hot dogs, and a million dollars a year in dyes alone were some of the problems involved in hearings held by the Food and Drug Administration in January.

The hearings concerned proposals to ban the use in foods, and perhaps also in drugs and cosmetics, of three coal-tar colors, or dyes, known as FD&C Red No. 32, FD&C Orange No. 1 and FD&C Orange No. 2. (The FD&C stands for Food, Drug and Cosmetic and refers to the FD&C Act of 1938.)

Chemically, these dyes are 1-xylylazo-2-naphthol, monosodium salt of 4-p-sulfophenylazo-1-naphthol, and 1-o-tolylazo-2-naphthol.

The second one in the list, FD&C Orange No. 1, was one of the first water-soluble azo dyes manufactured and was in common use in foods in the United States as far back as 1907. The other two have "obscure" histories, but were in use long before 1938. When the first so-called pure food law was passed almost half a century ago, these, among other colors, had been used in foods for many years and these three were certified for use in foods under that old law.

At that time, the safety of dyes in foods could not be tested with the accuracy possible today. In 1938, the new law made illegal the use in foods of any coal tar dye not certified. So the then new Food and Drug Administration, set up to administer the law, listed those dyes that had already been certified.

Since then, however, a number of things have been worrying FDA officials. One is that the law says if a substance is poisonous, it cannot be used in food even if the amount used is so small it will not harm the consumer. Because of that and because new tests had been developed, FDA had a series of colors tested. The results show that FD&C Red No. 32, FD&C Orange No. 1 and FD&C Orange No. 2 are not harmless, although in the quantity used in food, there has been no evidence of any injury to humans.

There was, however, that episode of some children getting stomach and intestinal upsets from Halloween candy. The candy, it turned out, was colored with a tremendously larger than usual amount of one of the colors. And the children's sickness was nothing like that seen in the laboratory animals given large doses of this same color.

Chief use for one of the three colors is in Florida oranges. Casings for sausages

take a lot of another of the colors. Cheese, cough drops and other drugs, as well as candies, cakes and cosmetics use the three colors.

If they are banned from foods and drugs taken internally, there may still be some questions about lipstick as to whether the dyes get into the body through the skin if they are in cosmetics or drugs used externally, such as lotions and creams.

Science News Letter, February 6, 1954

### GENETICS

## Breed Mice Strains That Tolerate Skin Grafting

► **STRAINS OF** mice so chemically similar that individuals react like identical twins to skin grafts have been bred at the Jackson Memorial Laboratory, Bar Harbor, Me.

Dr. George D. Snell of the Laboratory, reporting in the *Journal of the National Cancer Institute* (Dec., 1953), pointed out that, normally, chemical individuality is so great skin grafts between individuals cannot become permanently established. The one exception to this rule is identical twins.

In certain cases foreign grafts may function usefully for a time in supporting new growth, but ultimately the graft dies and sloughs off. Cornea transplants for the eye are not affected by this.

The members of the mice strains are so alike that skin grafts grow permanently when transplanted, Dr. Snell said. Grafts between strains, however, consistently fail.

Working with Dr. Snell were Drs. Paulo R. F. Borges and Elizabeth S. Russell, Miss Elizabeth Fekete, Miss Priscilla Smith and F. Gabrielson. The research was supported in part by grants from the National Cancer Institute, the American Cancer Society and the Anna Fuller Fund.

Science News Letter, February 6, 1954

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✿ **BOOK MATCHES** can be obtained in a kit containing four sheets of a 23-carat gold transfer paper. Using the transfer paper and a pencil or ball-point pen, the owner can "personalize" his own match books with gold lettering, script or picture designs. The matches make novel place cards when personalized for each guest.

Science News Letter, February 6, 1954

✿ **NEW FIRE** extinguisher goes into action when a pin is pulled and a lever is squeezed. Its dry chemicals fan out to cover the blaze effectively, snuffing out the fire rapidly. The water-tight, non-corrosive extinguishers have been tested for vibration and operation at temperatures from minus 40 degree Fahrenheit to 150 degrees.

Science News Letter, February 6, 1954

✿ **ACCELERATOR CONTROL** for automobiles is designed to hold the accelerator in a predetermined spot so the motorist can rest his right leg by moving it from the gas pedal. The device works only when the left foot rests on a special switch. The instant the driver takes his left foot from this floorboard switch, the throttle snaps to the idle position.

Science News Letter, February 6, 1954



✿ **PLASTIC IRRIGATION** dams can be folded up and carried about due to their light weight. Stretched across an irrigation ditch and over its banks, the dam is held in place by the weight of water it retains, as shown in the photograph. Made

of a vinyl sheeting, the dams are available in four-, five-, six- and seven-foot depths cut to any desired length.

Science News Letter, February 6, 1954

✿ **ELECTRIC KNIFE** sharpener for the kitchen features a small grinding wheel and buffer on the same motor-driven shaft. A plastic guard prevents the housewife from accidentally touching the grinder with her silverware as she polishes it to a sparkling brightness on the buffer.

Science News Letter, February 6, 1954

✿ **MAILABLE** 3-D picture souvenirs of some U. S. national parks and big cities consist of a cardboard viewer and color slides. The inexpensive viewer also is said to accept standard third-dimensional slides now being taken by many amateur photographers. The device folds into a small unit that can be slipped in an envelope.

Science News Letter, February 6, 1954

✿ **NEW 200-WATT** light bulb has been made smaller so that its size will be more convenient in homes, offices and factories. Now the size of 150-watt bulbs, the new 200-watt light has a coiled filament and a heat-reflecting disk designed to keep the base of the bulb from getting too hot.

Science News Letter, February 6, 1954

✿ **CELLULAR PLASTIC** insulation is a new polyethylene product that has been used successfully to insulate ultra-high frequency television antenna lead-in wires. The insulation's electrical qualities and its ability to float in water make it highly attractive for special applications.

Science News Letter, February 6, 1954

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## Do You Know?

Several states have laws which require young hunters seeking their first hunting licenses to take instruction in the proper care and use of firearms.

More people visited Chicago's Museum of Science and Industry during 1953 than bought tickets to professional baseball games played in that city.

For the second consecutive year, U. S. domestic scheduled airlines in 1953 operated at a passenger fatality rate of less than one per 100,000,000 passenger-miles flown.

The nation spends only \$4 a year per patient for research in the field of mental illness, while research in several physical diseases receives more than \$30 per patient.